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The Case for Stem Cell Counselors

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In little more than a decade, stem cell science has moved rapidly from discovery to testing in the clinic. Hundreds of stem cell clinical trials are estimated to be underway for a wide range of conditions (Trounson et al., 2011, 2012). A 2013 Pharmaceutical Research and Manufacturers of America report lists nearly 80 industry-sponsored cell trials under Food and Drug Administration review; 48 are classified as stem cell trials, and 5 of these are in phase 3 (Pharmaceutical Research and Manufacturers of America 2013). In cardiovascular indications alone, over 100 studies claiming stem cells as a modality are underway (National Institutes of Health, 2014). Dozens of these cardiac trials have already been completed (Zhang et al., 2014).

This robust translational push equates to thousands of patients enrolled in stem cell trials, and many more thousands of prospective participants inquiring about whether they are eligible for new studies. As a result, Trounson et al. (2012) warn that there is an urgent need for professionally trained staff to objectively explain the risks and benefits of stem cell transplants to prospective clinical trial subjects and their families. These trained experts, described here as stem cell counselors, could help potential participants navigate among trials; explain risks, benefits, and therapeutic alternatives; and provide information about unproven transplants offered outside the bounds of clinical research. Stem cell counselors would also work closely with patients enrolled in clinical trials and serve as a public resource for patient education and outreach efforts.

This paper describes how a new counseling profession could support clinical sites and patients enrolling in stem cell clinical trials. A model is proposed, along with a curriculum that would provide counselors with the tools to address major issues facing the clinical stem cell field. Finally, a candidate recruitment and clinical site interface scheme is offered.

The Model: Genetic Counseling

Genetic counseling—which emerged out of advances in human genetics—is a mature and successful example of a client-centered approach to medical care. At its core, genetic counseling provides information and support for people who have or may be at risk for genetic disorders. While genetic counseling began in pediatric/medical genetics and prenatal diagnosis, these professionals now work in many

specialty areas, including assisted reproductive technologies, noninvasive prenatal testing, cancer, cord blood banking, cardiology, neurology, psychiatry, metabolic disease, and genomics/personalized medicine (Minkoff and Berkowitz, 2014; Hendrick and Cobos, 2010). While these subfields are guided by genetics and heritability, a principle that finds resonance here is the acknowledgment that counseling is a communication process with patient autonomy at its core. Other long-standing precepts include knowledge of science, patient advocacy, respect for the values of patients and families, and teaching and providing information at a level appropriate to the patient's understanding and interest. Collectively, these activities serve to encourage context-rich, informed patient decisions (National Society of Genetic Counselors, 2014). The National Society of Genetic Counselors has recognized the importance of stem cell trials in a recent position statement outlining the different roles that genetic counselors can play in stem cell research, including identifying appropriate research subjects and educating the public (Kirkpatrick et al., 2013). However, counselors with rigorous training in stem cell sciences and related ethics, law, and social implications (ELSI) disciplines would provide the greatest benefit for patients and the public.

There are several models of genetic counseling that could ably serve patients seeking stem cell transplants. In light of the misinformation and hype surrounding stem cell science, a teaching-based, information-centered method would seem to have clear advantages. However, a strict patient education model may fall short when considering the ethical, social, and political complexities of stem cell clinical trials. Instead, a nondirective, person-centered model—developed by the psychologist Carl Rogers in the 1950s—would value the patient's belief system, strive to understand the patient's experiences a larger social context, and empower the patient to make independent, informed definitions free from coercion (Veatch, 2003). Taking this nondirective approach one step further, a biopsychosocial model—first proposed by George Engel—would attend to the biological, psychological, and social dimensions of the illness. Adapted to stem cell trials, this approach would integrate objective biomedical data along with the patient's subjective experience. In Engel's scheme, the goal is to transform the patient's role from a passive recipient of information to one of active, informed choice



supported by a caring, empathetic relationship (Engel, 1977; Borrell-Carrió et al., 2004).

With these genetic counseling models in mind, stem cell counselors would offer important advantages to individuals seeking to enroll in trials and assistance to study personnel. They include communicating specialized patient information, guarding against stem cell tourism, and bolstering the process of informed consent and personal autonomy.

Communicating Specialized Patient Information

Stem cell research organizations such as the International Society for Stem Cell Research (ISSCR), the Stem Cell Network of Canada, and the Australian Stem Cell Centre have produced educational materials on websites to help patients understand clinical trials, assess scientific evidence, and identify possible rogue clinics (International Society for Stem Cell Research, 2014; Stem Cell Network of Canada, 2014; National Stem Cell Foundation of Australia, 2013). These materials also highlight existing clinical trials and successful research outcomes (Master and Ogbogu, 2012), but traditional types of patient outreach and education efforts suffer from three limitations. First, the information is often transmitted one way—from experts to patient—without knowing whether it has been effectively communicated or whether it accounts for what patients and families might find most valuable in their decision making. Outreach is most effective when it directly engages individuals and respects values-based opinions and has become an essential part of patient-centered outcomes research (Patient-Centered Outcome Research Institute, 2014; Lensch, 2011; Murdoch and Scott, 2010). In addition, these materials encourage patients to consult with their physicians for specific information about preclinical studies, ethical oversight, and possible treatments. Professional responsibilities and legal obligations dictate that physicians must help patients understand this information, yet some physicians may not have the needed expertise—or the time—to offer meaningful recommendations, especially for those unproven stem cell interventions offered outside the bounds of a clinical trial (Levine and Wolf, 2012; Zarzeczny and Caulfield, 2010). Second, in a fast-moving, fluid field, patient education materials can quickly become outdated. Information may not reflect the most recent clinical or preclinical evidence supporting a study or fully detail the risks and benefits associated with a specialized type of transplant. Finally, materials are often generalized for broad audiences. Here, training in bioethics, regulation, and social implications of stem cell research would enrich communications with a wide variety of patients. Research subjects may have deeply held moral views or have widely varying degrees of technical and scientific understanding. They may need an advocate to

help them interpret results, navigate the hospital system, and ensure proper follow-up care. For example, some trials, such as for autism or spinal cord injury, may be conducted in charged and complicated sociopolitical environments. Some patient populations will be more vulnerable than others, and some may have different impressions of risk and benefit (Liu and Scott, 2014; Scott and Magnus, 2014). Finally, the local context of clinical trials is critical to meet local expectations, as fundamentally different types of relationships exist between patients and researchers (Hunt et al., 2005). As specific types of cells are used to treat specific diseases, counseling information will have to be current, accurate, and personalized.

Guarding Against Stem Cell “Tourism”

As the advent of genetic counseling served to distance human genetics from eugenics, an argument can be made for drawing a sharp boundary between ethical and unethical clinical practice in regenerative medicine (Veatch, 2003). Chief among these is the practice of traveling to receive unproven stem cell interventions, often called stem cell tourism (the common use of the term “stem cell tourism” is not generally preferred, although it continues to be widely used in the literature). This is primarily an Internet-based, direct-to-consumer marketed industry where patients travel to destinations outside their home country to receive untested and unproven clinical stem cell injections (Master and Resnik, 2013). One of the hallmarks of stem cell tourism is a form of arbitrage, where a market of clinics and patients—representing supply and demand—are set up along permissive and restrictive regulatory gradients. As a result, clinics offering unproven treatments are drawing unprecedented numbers of patients (Trounson et al., 2012).

Seeking out unproven stem cell interventions is not limited to international destinations. To varying degrees, some transplant clinics in the United States and other jurisdictions operate outside of regulation. In the United States, patients may frequent unregulated clinics in other states or within their own state. When it comes to guarding against stem cell tourism, there is little reliable information for potential patients on how the translational process ensures the safety and efficacy of stem cell treatments (Master et al., 2013). Disease advocacy groups lack good web-based educational content about stem cell clinical translation, and even scientific organizations have little information on proven stem cell treatments, the clinical translation process, and stem cell pseudomedicine (Master et al., 2014). Without a clearinghouse for patient education, resulting harms from stem cell tourism are sweeping and troublesome, including physical risk, erosion of public trust from ineffective procedures, and failure to gain generalizable knowledge. Undue burdens on health systems can result



from patients returning home with health complications and incomplete or missing medical information (Crooks et al., 2013). Patients who receive untested transplants may be disqualified from legitimate trials. Patients who travel may misperceive themselves as well-informed medical pioneers who contribute to scientific knowledge (Rachul, 2011). Indeed, as pediatric genetic counseling is routinely used for many disorders, it is safe to assume that parents will have understandable desires to help their children in the stem cell setting. This means that physicians and counselors must be guided by the best interests of minor patients, which include giving parents the best information possible about potential risks associated with unproven treatments (Zarzewny and Caulfield, 2010).

Understanding patient motivations and perspectives will be helpful in enabling autonomous choice. While it is true that some patients who travel for untested therapies will opt out of the medical system and thus bypass information gained from a counseling encounter, a mature field of credentialed professionals could become an important and timely resource for education about unproven transplants. Stem cell counselors, armed with current research and trained in psychosocial methods that respect patient beliefs and values, could help patients seeking therapies gain a sense of control and facilitate informed decision making—through the Internet or in person.

Bolstering Informed Consent and Patient Autonomy

In genetic counseling, enablement of autonomous decision making is considered a primary aim and respect for autonomy is used to justify an approach whereby patients are free to make their own choices after given all the necessary information. Similarly, a code of ethics for stem cell counseling would require that counselors provide relevant information for informed decision making while respecting patient's values and the social context of the trial. Together with their families, patients usually join trials with a basic understanding of the procedure; explanations of valid data are needed to responsibly describe the benefits and risks associated with a trial and compare stem cell interventions with other alternatives (Sipp and Turner, 2012). Some patients may need help navigating among competing trials. Thus, enabling a process of informed consent would be an essential part of a stem cell counselor's repertoire. Counselors would be trained in the ethical principles of informed consent and personal autonomy, with the goal of helping to bring a better informed volunteer to the enrollment desk. An informed choice model of stem cell counseling can offer "autonomy in relation," where the patient and family can make fully informed decisions with the stem cell counselor's advice (Borrell-Carrió et al., 2004).

There are good reasons to conduct a counseling session prior to enrollment in trials. Historically, the effectiveness

of informed consents has been challenged, with the hype and promise attached to stem cell treatments further complicating whether participants truly understand the risks associated with a particular trial (Appelbaum and Lidz, 2008; Henderson 2011). Studies show that the patients' ability to recall is usually poor (Flory and Emanuel, 2004), and the socioeconomic background and the environment of the study participants can influence comprehension of information (Bowling and Ebrahim, 2001). One way that a discussion of risks and benefits could be facilitated is through a staged process, where a consent document could be mailed to patients before their appointment and major questions could be fielded at the beginning of the session. As consents for stem cell trials are likely to contain variation about the types of cells transplanted, routes of administration, patient populations, and differing risks and benefits, counseling sessions could greatly enable informed decision making. The idea is not to provide informed consent in a counseling session, but to help the patient make sense of the document—and the risks and benefits—before they enroll in the trial.

What Would a Stem Cell Counseling Curriculum Look Like?

Depending on the background and experience of applicants, a 20–30 credit hour, certificate-based curriculum would be sufficient to train students in specific core competencies. In contrast, a 40 credit-hour, 1-year master's degree program would include a research component and specific training in certain disease areas. In either case, a curriculum comprised of three integrated, disciplinary pillars would include (1) basic and clinical sciences, (2) bioethics training in ELSI, and (3) psychosocial techniques. The major topics of instruction under these disciplines are summarized in Table 1.

Scientific instruction would include introductions to both basic and clinical stem cell science, including surveys of recent translational research. Knowledge of key ELSI issues would span research and clinical ethics and include cell, gamete, and embryo donation and topics in bio-banking. In order to properly advise prospective participants, counselors must be knowledgeable of the key regulatory frameworks, including national, state, and local guidelines, and the international oversight of stem cell transplants and clinics. A blended approach of instruction would include online, didactic, and clinical pedagogies, adapted from existing coursework at major research universities. Other instructional content would include virtual journal clubs and clinical rounds for trainees. Faculty supervisors and mentors would work individually with trainees on directed readings and independent study. As milestones for completed blocks of study, trainees would be given intensive 2-day capstone programs in rapidly



Table 1. Major Disciplinary Pillars for Training Stem Cell Counselors

Basic/Clinical Science	ELSI	Psychosocial
Genetics and epigenetics	responsible research conduct	counseling and communication techniques
Human embryology	cloning and moral status	underlying counseling models
Cell and stem cell biology	human-animal chimeras	role-play training
Renewal	embryo and tissue donation	psychosocial techniques
Potency	informed consent	medical communication
Signal transduction	therapeutic misconception	assessing family dynamics
Lineage restriction	stem cell tourism	referrals to patient networks
Cloning/reprogramming	biobanking	referrals to clinical experts
Translational biology	privacy and return of results	tourism hotlines/forums
Animal models	equipoise	cross-cultural competency
Cell processing	risk/benefit	working with interpreters
Transplant biology	local, state, federal law, and regulation	
Clinical research	protection of human subjects	
Trials design	international regulations & law	
Enrollment	clinical trials registries	
Conducting trials		
Patient advocacy		

evolving areas of stem cell research. These modules would give trainees the most current information about, for example, regulation of stem cell tourism and review the latest trials results for a given therapeutic area. Certificates or degrees are time limited: continuing education would be required in order to maintain certification. Recertification—especially in a developing field—is critical to ensure that counselors possess the most recent information and may eventually become parts of licensure, professional advancement, hospital credentialing, and insurance reimbursement.

Stem cell counselors would require professional competencies in the recruitment, enrollment, and conduct of clinical trials. They should be able to critically evaluate sci-

entific and trials-based information in order to assist potential and enrolled participants with support services and outreach programs. Even well-trained counselors will not be able to stay abreast of every new clinical development, and thus, an established society such as ISSCR or a national network of clinician-scientists at enrolling sites could assist counselors with specific client questions. The training would focus on teamwork, professionalism, and strong communication skills. Like their genetic counseling counterparts, stem cell counselors should be able to conduct client sessions to rigorously assess patient and family needs, identify concerns, and help potential trials subjects evaluate risks and benefits.

Admissions and Clinical Site Interface

In order to maximize the local expertise of clinical research programs conducting stem cell trials and to ensure a seamless integration of counselors into the research stream, clinical sites would put forward candidates for admission. Future stem cell counselors are imagined to have existing positions at sponsoring institutions and be allotted time to conduct their training as clinical trials are being planned or launched. Research institutions conducting trials would employ certified stem cell counselors, but to avoid conflicts of interest, counselors would not be supported directly by individual trials.

A portfolio approach could guide the admissions process. Instruction and credit-hour requirements would be tailored for individuals with proven professional strengths in any of the three core competencies. Nursing or social work professionals with strengths in clinical trials would seem to be well suited to the program, as would trained genetic counselors seeking to broaden their existing training. The curriculum would be designed so that trainees could take most of the instruction through self-paced online courses and blended instruction and would allow trainees to spend most of the time in training at their home institution. An additional, an intensive 2-week boot camp is also a potential model for certification, one that has been successfully used in clinical ethics training. Training could be augmented with virtual best practices sessions and workshops.

Research: An Added Benefit

A credentialed program in stem cell counseling could offer an important benefit to the stem cell field: research. Stem cell counselors could employ social science and empirical ethics approaches in ongoing research projects as part of their professional development. Unique or especially challenging counseling sessions could form the basis of further instruction through published case studies. Quantitative research projects involving patient understanding of complex medical information could inform outreach efforts and the design of better informed consent. Data captured



through curbside consults, online counseling forums, or interactions with prospective trials participants can add to the growing scholarship on the decisions patients make when considering enrollment in a clinical trial. These data could help health professionals and policy makers understand what types of information patients use when evaluating risks and benefit and identify gaps in knowledge and misperceptions. Social science methodologies such as grounded theory and content analysis would supply evidence-based theoretical frameworks for a counseling practice (McAllister, 2001). Communicating across different cultural and disability settings—including vulnerable patient populations—can be rigorously explored in a research framework. A mature stem cell counseling field would include a professional society, journals dedicated to the discipline, and new centers of excellence. Institutions that offer training would have the added benefit of a counseling core for stem cell clinical trials and ongoing ELSI research.

Challenges and Conclusions

The time is right for a credentialed stem cell counseling training program. Admittedly, this will take the resources and commitment of a research university with sufficient field strength in the stem cell sciences. In early 2014, The California Institute of Regenerative Medicine (CIRM) announced plans to fund an educational and outreach training (OET) program encompassing a stem cell counseling training core for its ambitious Alpha Clinic translational medicine initiative. This would have established the nation's first counseling program to serve the agency's initial tranche of clinical trials based in California. Unfortunately, CIRM restructured the Alpha Clinic initiative and cancelled the OET program.

Without grant support to launch a stem cell counseling discipline, universities conducting stem cell clinical trials must consider how a credentialing program could fit with the educational mission and how to support counselors as trials increase. Genetic counseling salaries were initially funded by a federal center grant and have slowly moved to patient billing to cover part or all of the salaries. The ability to bill and to be reimbursed was due to genetic counselors becoming credentialed providers through payors; credentialing was in turn influenced positively by state-based licensure. Therefore, a sustainable profession must begin with training and credentialing. Many genetic counselors now cover salaries with a combination of clinical or hospital work and patient care. As most trials will be early phase with low numbers of patients, initial caseloads (and associated costs) are expected to be low, but this raises challenges for sites where the number of trials would not justify a full time professional. As numbers of trials increase, institutionally based counseling services could be built into

departmental budgets. On the training side, with modest investment and clear milestones, a certificate program could grow to a degree-granting master's level effort, with tuition revenue for the host institution and wide-ranging benefits to patients, clinicians, and the public.

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REFERENCES

- Appelbaum, P.S., and Lidz, C.W. (2008). Twenty-five years of therapeutic misconception. *Hastings Cent. Rep.* 38, 5–6, author reply 6–7.
- Borrell-Carrió, F., Suchman, A.L., and Epstein, R.M. (2004). The biopsychosocial model 25 years later: principles, practice, and scientific inquiry. *Ann. Fam. Med.* 2, 576–582.
- Bowling, A., and Ebrahim, S. (2001). Measuring patients' preferences for treatment and perceptions of risk. *Qual. Health Care* 10 (Suppl 1), i2–i8.
- National Institutes of Health (2014). ClinicalTrials.gov: a service of the U.S. National Institutes of Health. <https://clinicaltrials.gov>.
- Crooks, V.A., Turner, L., Cohen, I.G., Bristeir, J., Snyder, J., Casey, V., and Whitmore, R. (2013). Ethical and legal implications of the risks of medical tourism for patients: a qualitative study of Canadian health and safety representatives' perspectives. *BMJ Open* 3, e002302.
- Engel, G.L. (1977). The need for a new medical model: a challenge for biomedicine. *Science* 196, 129–136.
- Flory, J., and Emanuel, E. (2004). Interventions to improve research participants' understanding in informed consent for research: a systematic review. *JAMA* 292, 1593–1601.
- Henderson, G.E. (2011). Is informed consent broken? *Am. J. Med. Sci.* 342, 267–272.
- Hendrick, S.S., and Cobos, E. (2010). Practical model for psychosocial care. *J. Oncol. Pract.* 6, 34–36.
- Hunt, L.M., de Voogd, K.B., and Castañeda, H. (2005). The routine and the traumatic in prenatal genetic diagnosis: does clinical information inform patient decision-making? *Patient Educ. Couns.* 56, 302–312.
- International Society for Stem Cell Research (2014). A closer look at stem cell treatments. <http://www.closerlookatstemcells.org>.
- Kirkpatrick, B., Hercher, L., Facio, F., Fonda, J., Hahn, S., Sapp, J., and Zierhut, H.; Stem Cell Research Task Force on behalf of the Public Policy Committee (2013). Stem cell research and therapy: the position of the National Society of Genetic Counselors. *J. Genet. Couns.* 22, 407–410.
- Lensch, M.W. (2011). Public perception of stem cell and genomics research. *Genome Med.* 3, 44.



- Levine, A.D., and Wolf, L.E. (2012). The roles and responsibilities of physicians in patients' decisions about unproven stem cell therapies. *J. Law Med. Ethics* 40, 122–134.
- Liu, E.Y., and Scott, C.T. (2014). Great expectations: autism spectrum disorder and induced pluripotent stem cell technologies. *Stem Cell Rep.* 10, 145–150.
- Master, Z., and Ogbogu, U. (2012). Stem cell tourism in the era of personalized medicine: what we know, and what we need to know. *Curr. Pharmacogenom. Personalized Med.* 10, 106–110.
- Master, Z., and Resnik, D.B. (2013). Promoting public trust: ESCROs won't fix the problem of stem cell tourism. *Am. J. Bioeth.* 13, 53–55.
- Master, Z., Zarzeczny, A., Rachul, C., and Caulfield, T. (2013). What's missing? Discussing stem cell translational research in educational information on stem cell "tourism". *J. Law Med. Ethics* 41, 254–268.
- Master, Z., Robertson, K., Frederick, D., Rachul, C., and Caulfield, T. (2014). Stem cell tourism and public education: the missing elements. *Cell Stem Cell* 15, 267–270.
- McAllister, M. (2001). Grounded theory in genetic counseling research. *J. Genet. Couns.* 10, 233–250.
- Minkoff, H., and Berkowitz, R. (2014). The case for universal prenatal genetic counseling. *Obstet. Gynecol.* 123, 1335–1338.
- Murdoch, C.E., and Scott, C.T. (2010). Stem cell tourism and the power of hope. *Am. J. Bioeth.* 10, 16–23.
- National Society of Genetic Counselors (2014). What is genetic counseling? <http://nsgc.org/p/cm/ld/fid=43>.
- National Stem Cell Foundation of Australia (2013). The Australian stem cell handbook: what you should know about stem cell therapies, now and in the future. <http://www.stemcellfoundation.net.au/docs/patient-handbook/the-australian-stem-cell-handbook.pdf?sfvrsn=4>.
- Patient-Centered Outcome Research Institute (2014). Patient-Centered Outcomes Research Institute: about us. <http://www.pcori.org/about-us>.
- Pharmaceutical Research and Manufacturers of America (2013). Medicines in development: biologics. <http://www.phrma.org/sites/default/files/pdf/biologics2013.pdf>.
- Rachul, C. (2011). "What have I got to lose?" An analysis of stem cell therapy patient's blogs. *Health Law Rev.* 20, 5–12.
- Scott, C.T., and Magnus, D. (2014). Wrongful termination: lessons from the Geron clinical trial. *Stem Cells Transl. Med.* Published online October 8, 2014. <http://dx.doi.org/10.5966/sctm.2014-0147>.
- Sipp, D., and Turner, L. (2012). Stem cells. U.S. regulation of stem cells as medical products. *Science* 338, 1296–1297.
- Stem Cell Network of Canada (2014). What you need to know about stem cell therapies. <http://www.stemcellnetwork.ca/index.php?page=patientbooklet&hl=eng>.
- Trounson, A., Thakar, R.G., Lomax, G., and Gibbons, D. (2011). Clinical trials for stem cell therapies. *BMC Med.* 9, 52.
- Trounson, A., DeWitt, N.D., and Feigal, E.G. (2012). The Alpha Stem Cell Clinic: a model for evaluating and delivering stem cell-based therapies. *Stem Cells Transl. Med.* 1, 9–14.
- Veatch, P.M. (2003). Overview of genetic counseling: history of the profession and methods of practice. In *Facilitating the Genetic Counseling Process*, P.M. Veatch, B.S. LeRoy, and D.M. Bartels, eds. (New York: Springer), pp. 23–37.
- Zarzeczny, A., and Caulfield, T. (2010). Stem cell tourism and doctors' duties to minors—a view from Canada. *Am. J. Bioeth.* 10, 3–15.
- Zhang, H., Wang, H., Li, N., Duan, C.E., and Yang, Y.J. (2014). Cardiac progenitor/stem cells on myocardial infarction or ischemic heart disease: what we have known from current research. *Heart Fail. Rev.* 19, 247–258.